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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/127,094	08/27/98	MIYAMORI	M 7582P

021302
KYOCERA & YOSHIDA
EIGHT PENN CENTER
SUITE 1350, 1628 JOHN F KENNEDY BLVD
PHILADELPHIA PA 19103

MM91/1010

EXAMINER	
VU, H	
ART UNIT	PAPER NUMBER
2811	

DATE MAILED:
10/10/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/137,084	STUMBORG ET AL.
Examiner	**Art Unit**
HUNG VU	2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Jun 18, 2001*

2a) ☐ This action is **FINAL.** 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-13, 21, and 23-28* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideratio

5) ☒ Claim(s) *1, 21, and 27* is/are allowed.

6) ☒ Claim(s) *2-13, 23-26, and 28* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☐ Notice of References Cited (PTO-892)
16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
18) ☐ Interview Summary (PTO-413) Paper No(s). _____
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other:

DETAILED ACTION

Continued Prosecution Application

1. The request filed on 06/18/01 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 09/137,084 is acceptable and a CPA has been established. An action on the CPA follows.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-13, 23-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farnworth et al. (PN 5,962,921, of record).

Farnworth et al. discloses a semiconductor device comprising,

a semiconductor substrate material (30,36) having a surface;

a barrier film (34) directly on the substrate surface, the barrier film having a layer comprising elemental barium atoms attached to the surface;

a conductor (12) on the barrier film, wherein the elemental barium atoms are between the conductor and the semiconductor substrate such that barrier film inhibits diffusion of the conductor into the semiconductor substrate material;

wherein the barrier film is a single layer;

wherein the barrier film comprises a plurality of layers;

wherein the substrate material having a portion comprising a silicon semiconductor;

wherein the substrate material having a portion comprising an insulating material;

wherein the substrate having a portion comprising semiconductor silicon, and the barrier film directly contact the substrate. Note Figures 3-3C of Farnworth et al..

Farnworth et al. does not clearly disclose a conductor having a tendency to diffuse into the substrate material if in direct contact, however, it is well-known in the semiconductor art that metal conductor has tendency to diffuse into the substrate.

With regard to claim 23, Farnworth et al. discloses all of the claimed limitation except thickness of the elemental barium atoms layer. Although Farnworth et al. does not teach the exact the thickness of the elemental barium atoms layer, however, it would have been obvious to one of ordinary skill in the art to form Farnworth et al.'s elemental barium atoms layer having a thickness as claimed range because the thickness of the elemental barium atoms layer is variable of importance subject to routine experimentation and optimization.

With regard to claims 11-13, Farnworth et al. discloses all of the claimed limitations except the conductor comprising copper and the substrate comprising silicon oxide. Although Farnworth et al. does not teach the exact the material as that claimed by Applicant, however, it would have

been obvious to one of ordinary skill in the art at the time the invention was made to form the structure having the materials as claimed, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

3. Claims 2-13, 23-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsukamoto et al. (PN 5,285,079, of record)

Tsukamoto et al. discloses a semiconductor device comprising,

a substrate material (101-104) having a surface;

a barrier film on the substrate surface, the barrier film having a layer comprising elemental barium atoms attached to the surface;

a metallic conductor (106) on the barrier film, wherein barrier film inhibits diffusion of the conductor into the substrate;

wherein the substrate material is a silicon semiconductor, and the barrier film directly contacts the substrate. Note Figure 1 of Tsukamoto et al..

Tsukamoto et al. does not clearly disclose a conductor having a tendency to diffuse into the substrate material if in direct contact, however, it is well-known in the semiconductor art that metal conductor has tendency to diffuse into the substrate.

With regard to claim 23, Tsukamoto et al. discloses all of the claimed limitation except thickness of the elemental barium atoms layer. Although Tsukamoto et al. does not teach the exact the thickness of the elemental barium atoms layer, however, it would have been obvious to one of ordinary skill in the art to form Tsukamoto et al.'s elemental barium atoms layer having a thickness as claimed range because the thickness of the elemental barium atoms layer is variable of importance subject to routine experimentation and optimization.

With regard to claims 10-13, Tsukamoto et al. discloses all of the claimed limitations except the conductor comprising copper, and the substrate comprising silicon oxide. Although Tsukamoto et al. does not teach the exact the material as that claimed by Applicant, however, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the structure having the materials as claimed, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Allowable Subject Matter

4. Claims 1, 21, and 27 are allowed.

Response to Arguments

5. Applicant's arguments filed 05/01/01 have been fully considered but they are not persuasive.

It is argued, at pages 3-4 of the Remarks, that Farnworth et al. does not teach the conductor 34 is located directly on the semiconductor substrate, but there is an insulating layer 36 therebetween, as recited in claim 2. This argument is not convincing because Farnworth et al. clearly teaches the conductor 34 is located directly on the semiconductor substrate. The claim does not specific state that the conductor must be directly on and in direct contact with the semiconductor substrate.

It is argued, at page 4 of the Remarks, that Farnworth et al. teaches a list of 29 possible materials which can be included in the conductor 34, one of which is barium, and that Farnworth et al. does not specify that barium, if included in the conductor 34, is elemental barium nor does Farnworth et al. contain an example of elemental barium. This argument is not convincing because Farnworth et al. teaches a list of 29 possible materials which can be used to form the conductor 34. Farnworth et al. does not teach the list of 29 possible materials which can be included in the conductor 34. Therefore, if barium is used to form the conductor 34, it is certainly be the elemental barium. Also note that Farnworth et al. mentions some of the material in the list can be easily plated or metallized. It does not mean other techniques cannot be used.

It is argued, at pages 4-5 of the Remarks, that Farnworth et al. does not teach the conductive material has a tendency to diffuse into the semiconductor substrate. This argument is not convincing because it is well-known in the semiconductor art that metal conductor has tendency to diffuse into the substrate.

It is argued, at pages 5-6 of the Remarks, that Farnworth et al. does not teach the conductor layer having a thickness of approximately 5 Å to approximately 100 Å, and this thickness is not an obvious design choice. This argument is not convincing because the thickness of the elemental barium atoms layer is variable of importance subject to routine experimentation and optimization.

It is argued, at page 7 of the Remarks, that Tsukamoto et al. does not teach the barium layer between the conductor and the semiconductor substrate. This argument is not convincing because Tsukamoto et al. clearly teaches the barium layer (105) between the conductor (106) and the semiconductor substrate (101-104). Note col. 3, line 63 to col. 4, line 3 of Tsukamoto et al..

Conclusion

6. Papers related to this application may be submitted to Technology Center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number

is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to ***Hung Vu*** whose telephone number is **(703) 308-4079**. The Examiner is in the Office generally between the hours of 7:30 AM to 4:00 PM (Eastern Standard Time) Monday through Friday.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **(703) 308-0956**.

Vu

October 6, 2001

Steven Loke
Primary Examiner

Steven Loke